Project B-209

GLASS WOOL INSULATION

A Manufacturing Opportunity in Georgia

Prepared for

The Georgia Department of Industry and Trade
100 State Capitol
Atlanta, Georgia

by

Harvey Diamond

Industrial Development Division
Engineering Experiment Station
GEORGIA INSTITUTE OF TECHNOLOGY
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Summary

A Georgia manufacturer of glass wool can supply $5 million worth of insulation products to the Southeast[1/] at cost savings of between $348,000 and $819,000 over existing plants now competing for the same market.

Although 10% of the glass wool produced in the nation is purchased and used in the Southeast, none is manufactured in the Southeast.

In 1963 the six southeastern states consumed $21 million worth of glass fiber insulation. It is estimated that the demand will reach $34 million in 1970.

The principal distributing point in the Southeast is Atlanta, with 15% of all building material wholesale sales in the entire study area.

By locating a manufacturing plant in Georgia, a glass wool insulation company can effectuate the following cost savings:

1. Freight Savings. The expense incurred in shipping $5 million worth of glass fiber insulation to the principal distribution points in the Southeast is $162,000 to $243,000 less from Atlanta than from any city presently manufacturing glass wool.
2. Labor Savings. The production labor required to produce $5 million worth of glass wool insulation would cost $151,000 to $537,000 less in Georgia than in states with existing manufacturing facilities.
3. Fuel Savings. The natural gas needed to manufacture $5 million worth of glass wool insulation costs less in Atlanta than in most cities now producing these products. Actual fuel savings could reach $156,000.

In addition to the above cost savings, a Georgia manufacturer can anticipate an ample supply of available labor coupled with a low work stoppage record.

The presence of an adequate supply of raw materials in the Southeast further enhances Georgia's competitive position.

1/ Alabama, Florida, Georgia, North Carolina, South Carolina, and Tennessee.

INTRODUCTION

Plants primarily engaged in manufacturing glass wool insulation products are classified under "mineral wool" (SIC 3296) by the U. S. Government. However, the manufacturing procedures and requirements of these glass wool products bear more similarity to those of products classified in the pressed and blown glass industry (SIC 3229) than to the manufacturing methods of other products listed in the mineral wool classification. Consequently, both SIC groups are referred to in this report.

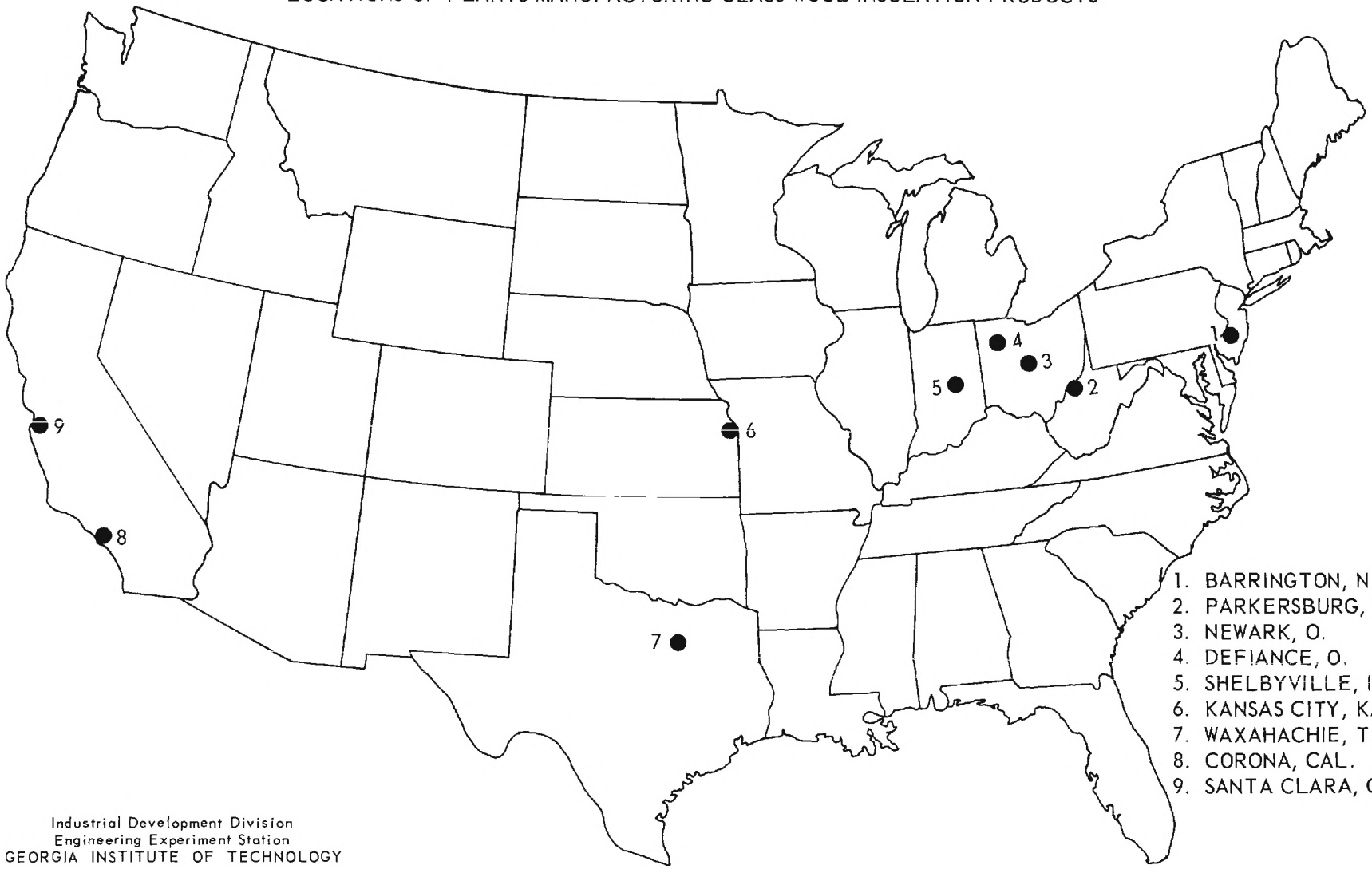
In the 25 years since its commercial inception, the manufacture of glass wool insulation has been best suited to large multimillion-dollar plant operations. Almost all of the $212 million worth of fibrous glass insulation produced nationally in 1963 was manufactured in fewer than 15 plants in nine cities. (See Map 1.) The major producers of glass wool are:

Gustin-Bacon Manufacturing Company
Johns-Manville Fiber Glass Division
Owens-Corning Fiberglas Corporation
Pittsburgh Plate Glass Company

The fiber glass insulation consumed in the Southeast is either warehoused in the area or shipped to the contractor or builder directly from the plant. There are no fiber glass insulation products manufactured in any of the six southeastern states.

MAP 1

LOCATIONS OF PLANTS MANUFACTURING GLASS WOOL INSULATION PRODUCTS



1. BARRINGTON, N. J.
2. PARKERSBURG, W. VA.
3. NEWARK, O.
4. DEFIANCE, O.
5. SHELBYVILLE, IND.
6. KANSAS CITY, KAN.
7. WAXAHACHIE, TEX.
8. CORONA, CAL.
9. SANTA CLARA, CAL.

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THE MARKETS

National Market

In 1960 more than $163 million worth of fibrous glass wool was produced in the United States.[1/] Spurred by an increase in residential and industrial construction, production expanded to $212 million in 1963.

Until recent years there have been no useful statistics available pertaining to the production or consumption of glass wool. However, fibrous glass is the major component of the mineral wool industry, for which data are readily available; consequently, the future growth of glass wool insulation may be expected to parallel that of the mineral wool industry. A first-degree projection of mineral wool shipments forecasts a market of approximately $516 million for 1970. (See Figure 1.) Over a 20-year span this would be an average yearly increase of almost 7%. This indicates that the national market for glass wool should be approximately $340 million in 1970.

Since mineral wool products are used primarily for structural and industrial insulation, it is not surprising to find an extremely high coefficient of correlation (0.97) between shipments of mineral wool and the national volume of residential and nonresidential construction. (See Appendix 1.)

Southeastern Market[2/]

The southeastern proportion of the valuation of authorized building permits issued in the United States has remained comparatively constant for many years. (See Table 1.)

By introducing the high correlation between building construction and mineral wool shipments as a southeastern market indicator, the present and future southeastern market for glass wool can be estimated. Since 10% of the building construction in the United States takes place in the Southeast, it can be assumed that the southeastern states consume and will continue to consume approximately 10% of the national glass wool production. Based on this assumption,

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1/ U. S. Bureau of the Census, Current Industrial Reports, BDSAF-614 (60)-1, July 20, 1961.

2/ Alabama, Florida, Georgia, North Carolina, South Carolina, and Tennessee.

FIGURE 1

SALES TREND OF MINERAL WOOL

the 1963 southeastern fiber glass insulation market was more than $21 million, and this market should increase in volume to approximately $34 million in 1970.

Table 1

TOTAL VALUE OF BUILDING PERMITS AUTHORIZED IN THE SOUTHEAST AS PERCENTAGE OF VALUE IN THE U. S., 1954-1962

Year	Building Permits Authorized (in millions of dollars)		Southeast as Per Cent of U. S.
	Southeast	United States	
1954	1,514	16,485	9.2
1955	1,721	18,939	9.1
1956	1,769	18,788	9.4
1957	1,828	18,169	10.1
1958	2,047	20,090	10.2
1959	2,247	22,467	10.0
1960	1,983	17,833	11.1
1961	2,021	18,946	10.7
1962	2,093	20,577	10.2

Note: Figures for 1954-1959 include private and public building permits, while those for 1960-1962 include only private permits.

Source: U. S. Bureau of the Census, Construction Review, 1955-1963

Fiber glass wool products, particularly those used for residential construction, are usually distributed through building materials wholesalers. The wholesale sales of these companies give a good indication of the comparative area consumption of these items.

In 1958 distributors in the six southeastern states wholesaled $1,091 million worth of construction and lumber materials. This is 10.3% of the national total and compares very favorably with the southeastern percentage of the value of authorized building permits in Table 1.

Wholesalers in seven southeastern cities supply almost 53% of construction materials used in the region. (See Table 2.) An additional 25% is distributed from 15 other cities. (See Map 2.)

Table 2

ANNUAL WHOLESALE SALES OF CONSTRUCTION AND LUMBER MATERIALS
IN PRINCIPAL SOUTHEASTERN CITIES

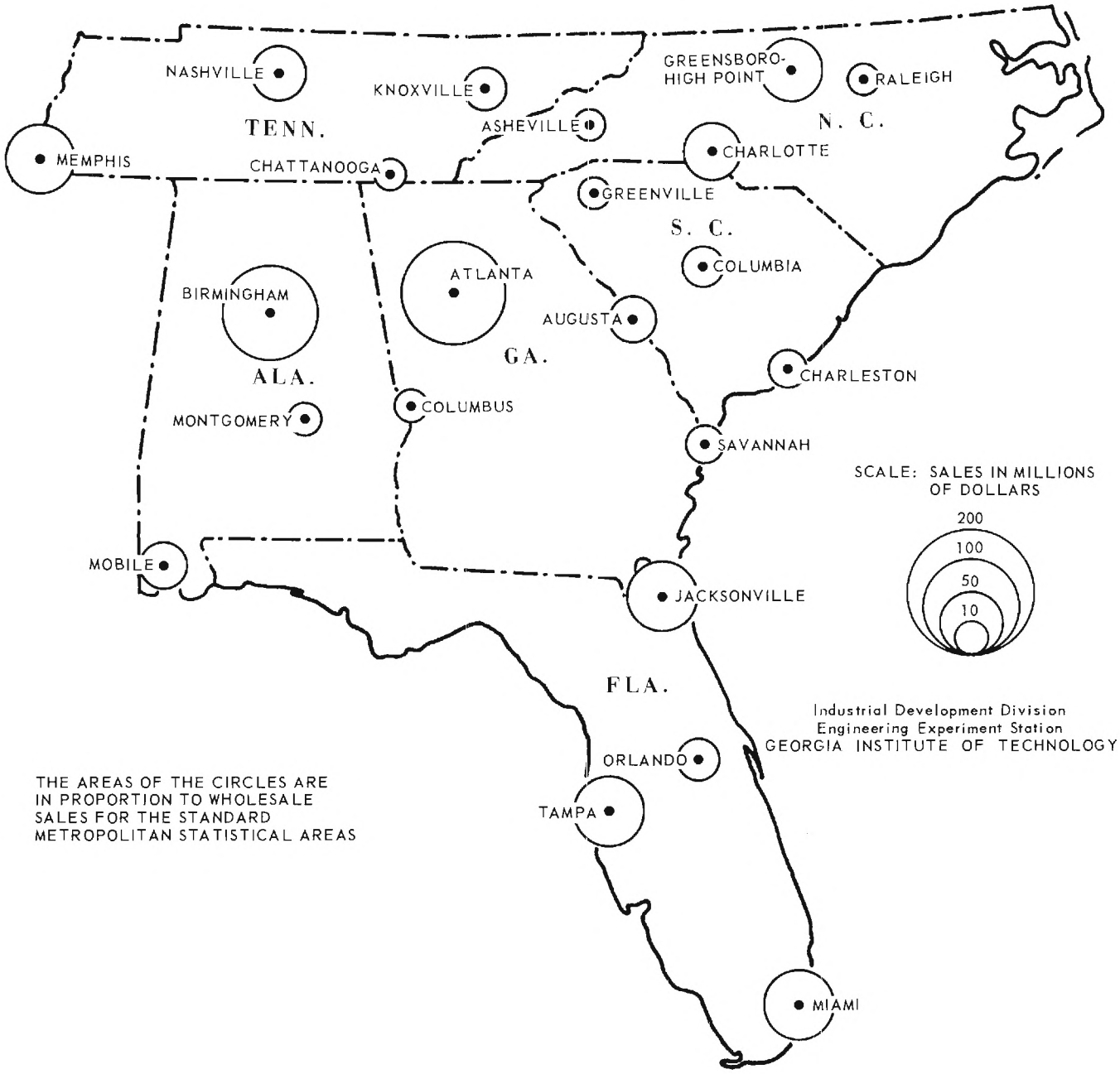
City	Wholesale Sales (in millions of dollars)	Percentage of Sales in Seven Cities
Atlanta, Ga.	164.5	28
Birmingham, Ala.	107.4	19
Miami, Fla.	71.4	12
Jacksonville, Fla.	71.2	12
Memphis, Tenn.	61.3	11
Tampa-St. Petersburg, Fla.	57.7	10
Charlotte, N. C.	44.6	8
	578.1	100

Source: U. S. Bureau of the Census, 1958 Census of Business -- Wholesale Trade

Atlanta, with annual wholesale sales of construction and lumber products amounting to $164 million, distributes 15% of all the building materials used in the Southeast.

MAP 2

WHOLESALE SALES OF CONSTRUCTION AND LUMBER
MATERIALS IN STANDARD METROPOLITAN AREAS IN THE SOUTHEAST



SOURCE: U. S. Bureau of the Census, 1958 Census of Business – Wholesale Trade

RAW MATERIALS

Most of the raw materials required to manufacture glass wool insulation products economically either are readily available in Georgia or can be obtained from sources in proximity to the southeastern area. (See Map 3.) The cost of transporting these raw materials to a plant in Georgia would be comparable with similar costs of existing manufacturers.

Sand

A high-purity silica sand (.025% Fe_2C_3) is found in Thomas County, Georgia. Sand of glass quality also has been reported from various other points in the state. Chemical analyses are available.

Feldspar

Potassium feldspar is produced in Jasper County, Georgia, while sodium feldspar is available from Spruce Pine, North Carolina.

Limestone

Limestone can be shipped into Georgia from Cowan and Anderson, Tennessee.

Soda Ash

Soda ash must be obtained from outside the immediate Georgia area. Plants in Baton Rouge, Louisiana, and Saltville, Virginia, would be the most convenient sources for a Georgia manufacturer.

Borates

Since practically all borates are mined in California, a Georgia manufacturer, along with all other glass wool producers, must rely upon the West Coast as a supply source.

Phenolic Resins

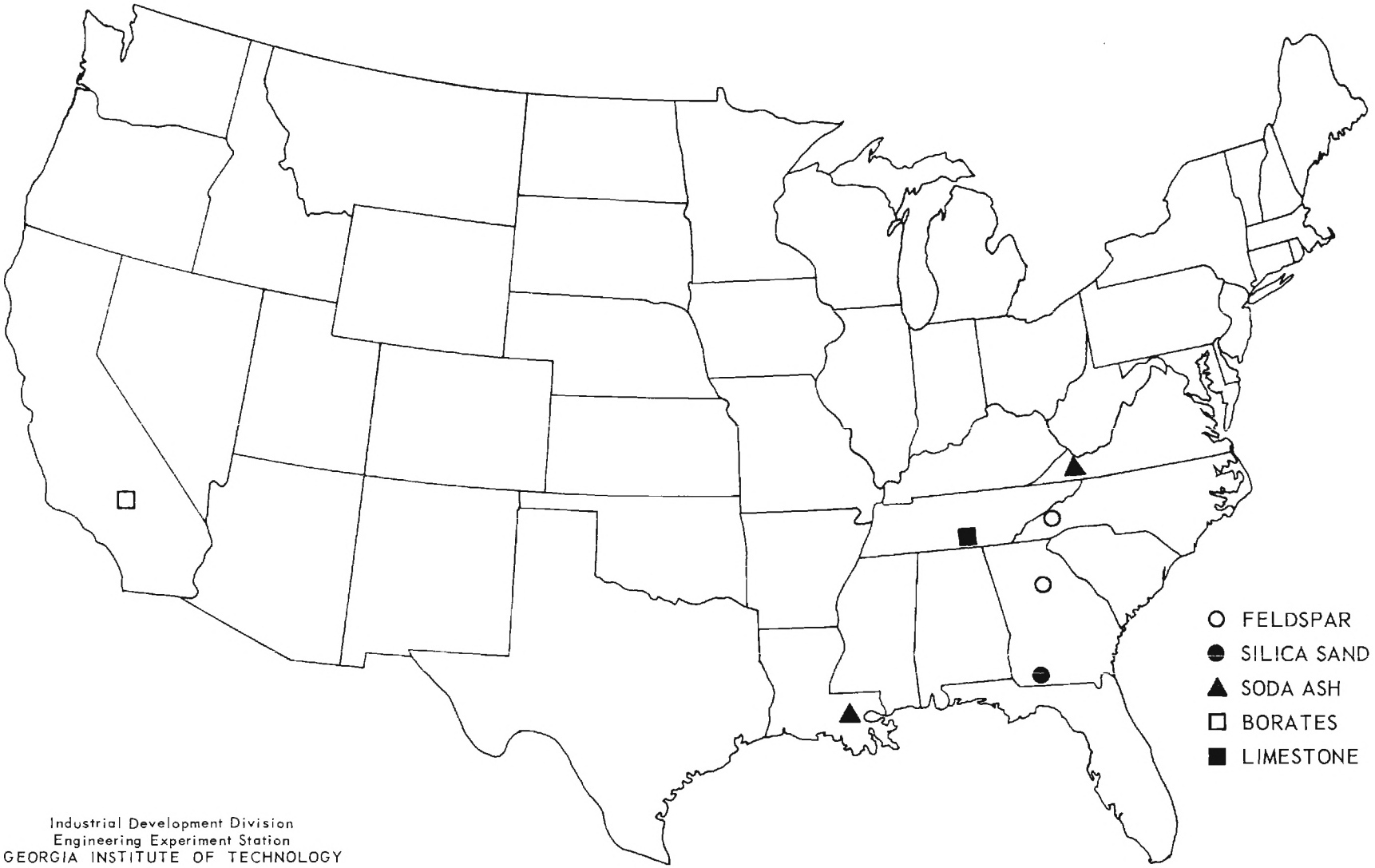
Phenolic resins, used as a binder, are warehoused in Atlanta and are shipped prepaid to the customer.

Marbles

If a Georgia manufacturer wished to produce insulation wool from glass in the marble form, these marbles could be shipped to Georgia at a freight cost of between $18.60 and $24.60 per ton.

MAP 3

SOURCES OF RAW MATERIALS FOR GLASS WOOL MANUFACTURE



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ADVANTAGES OF A GEORGIA LOCATION

Freight Savings

An important factor to be considered by glass wool manufacturers is freight costs to the consumer. One major fiber glass consumer places finished product transportation costs at 8% of the value of shipments. This percentage is probably typical of the entire industry. These high freight costs can only be lessened by shipping from within the market area.

The freight rates for glass wool insulating material from a Georgia plant to the southeastern cities wholesaling the most construction and lumber materials are less than from any manufacturer presently shipping to the same cities. Actual freight rates from cities with plants now supplying the Southeast and from Atlanta, together with average freight rates to the area from each of these cities, are shown in Appendix 2.

In 1963, 965 million pounds of glass insulation fiber were produced in the United States, with a value of shipments of $212 million, or 22 cents per pound. Selling at this price, a manufacturer with sales of $5 million would ship more than 11,350 tons of fiber annually. Because of the bulk of glass wool products, a loaded car would weigh approximately 70% of the rated carload capacity of 24,000 pounds. This would necessitate shipments of about 1,300 carloads annually.

If it is assumed that plants presently producing glass wool for southeastern consumption were to ship an equal number (1,300) of carloads to the same cities in the Southeast, then comparative annual freight costs may be estimated by multiplying the average freight rates from each producing city (Appendix 2) by the number of carloads and by the capacity of each car (24,000 pounds). These figures are shown in Table 3.

Table 3

FREIGHT COSTS FOR SHIPPING
GLASS INSULATION PRODUCTS TO THE SOUTHEAST

City	Average Freight Rates (per 100 lbs.)		No. of Carloads		Capacity of Carload (in 100 lbs.)		Annual Freight Cost
Kansas City, Kan.	$1.50	x	1,300	x	240	=	$468,000
Barrington, N. J.	1.47	x	1,300	x	240	=	459,000
Waxahachie, Tex.	1.45	x	1,300	x	240	=	452,000
Defiance, Ohio	1.34	x	1,300	x	240	=	418,000
Newark, Ohio	1.33	x	1,300	x	240	=	415,000
Shelbyville, Ind.	1.24	x	1,300	x	240	=	387,000
ATLANTA, GA.	.72	x	1,300	x	240	=	225,000

A manufacturer of glass wool in Georgia, producing $5 million worth of insulation materials for consumption in the Southeast, can realize the following freight savings over manufacturers presently supplying an equal volume to the southeastern area:

Atlanta over	Kansas City	$243,000
	Barrington	234,000
	Waxahachie	227,000
	Defiance	193,000
	Newark	190,000
	Shelbyville	162,000

Labor Cost Savings

Value added by manufacture per dollar of production wages paid in the pressed or blown glass and glassware industry (SIC 322) is from 16% to 57% higher in Georgia than in any state now manufacturing fiber glass insulation products. The value added per wage dollar for Georgia and each of the major producing states is shown in Table 4. These values were determined by dividing the total value added by manufacture by total production wages in SIC 322 for each of the states.[1/]

1/ U. S. Bureau of the Census, U. S. Census of Manufactures: 1958, Volume III, "Area Statistics."

Table 4

LABOR PRODUCTIVITY OF SELECTED GLASS INDUSTRIES
IN GEORGIA AND MAJOR GLASS WOOL PRODUCING STATES

State	Value Added per Wage Dollar
GEORGIA	$3.70
Texas	3.19
Kansas	2.82
Ohio	2.54
New Jersey	2.39
Indiana	2.36

Note: Since data for SIC 322 were not directly available for Georgia, Texas, Kansas, and New Jersey, they were calculated by subtracting all the other three-digit industries (i.e., SIC 321 and SIC 323 through SIC 329) listed in the Census of Manufactures for each state from the two-digit (SIC 32) industry totals for those respective states.

Source: Derived from data in U. S. Census of Manufactures: 1958

The effectiveness of the labor dollar in Georgia can not be explained solely in terms of regional wage differentials, although wage rates generally are lower in Georgia than in the compared states. More significantly, it suggests the potential in Georgia for greater production efficiency and increased labor productivity.

In 1958 the value added by manufacture for SIC 3229 equalled 70% of the industry's value of shipments. At this proportion a glass wool manufacturing plant with sales of $5 million would have a value added by manufacture of $3.5 million. By dividing the value added by manufacture by value added per wage dollar, production labor costs for a $5-million operation in each of the compared states can be estimated. These costs would be:

Indiana	$3,500,000	÷	$2.36	= $1,483,000
New Jersey	3,500,000	÷	2.39	= 1,464,000
Ohio	3,500,000	÷	2.54	= 1,378,000
Kansas	3,500,000	÷	2.82	= 1,241,000
Texas	3,500,000	÷	3.19	= 1,097,000
GEORGIA	3,500,000	÷	3.70	= 946,000

A manufacturer in Georgia producing $5 million worth of glass wool insulation can anticipate the following production labor cost savings over plants presently manufacturing these products in other states:

Georgia over	Indiana	$537,000
	New Jersey	518,000
	Ohio	432,000
	Kansas	295,000
	Texas	151,000

Added Labor Advantages

Quantity and Quality of Available Labor. Two large glass manufacturing plants in the Atlanta area report an adequate supply of local labor. It is the opinion of these manufacturers that the quality of the Georgia worker equals or surpasses that of labor in other plants maintained by these same national companies.

Work Stoppage Record. A glass fiber plant must run on a three-shift basis. Work stoppages for this type of operation would be extremely costly. During the three years from 1960 through 1962 the ratio of work stoppage to total working time was less in Georgia than in any state presently manufacturing glass wool for the southeastern market.

Fuel Costs

Natural gas, the fuel most frequently used in manufacturing fiber glass wool, is available in Georgia from three major pipeline companies. (See Map 4.)

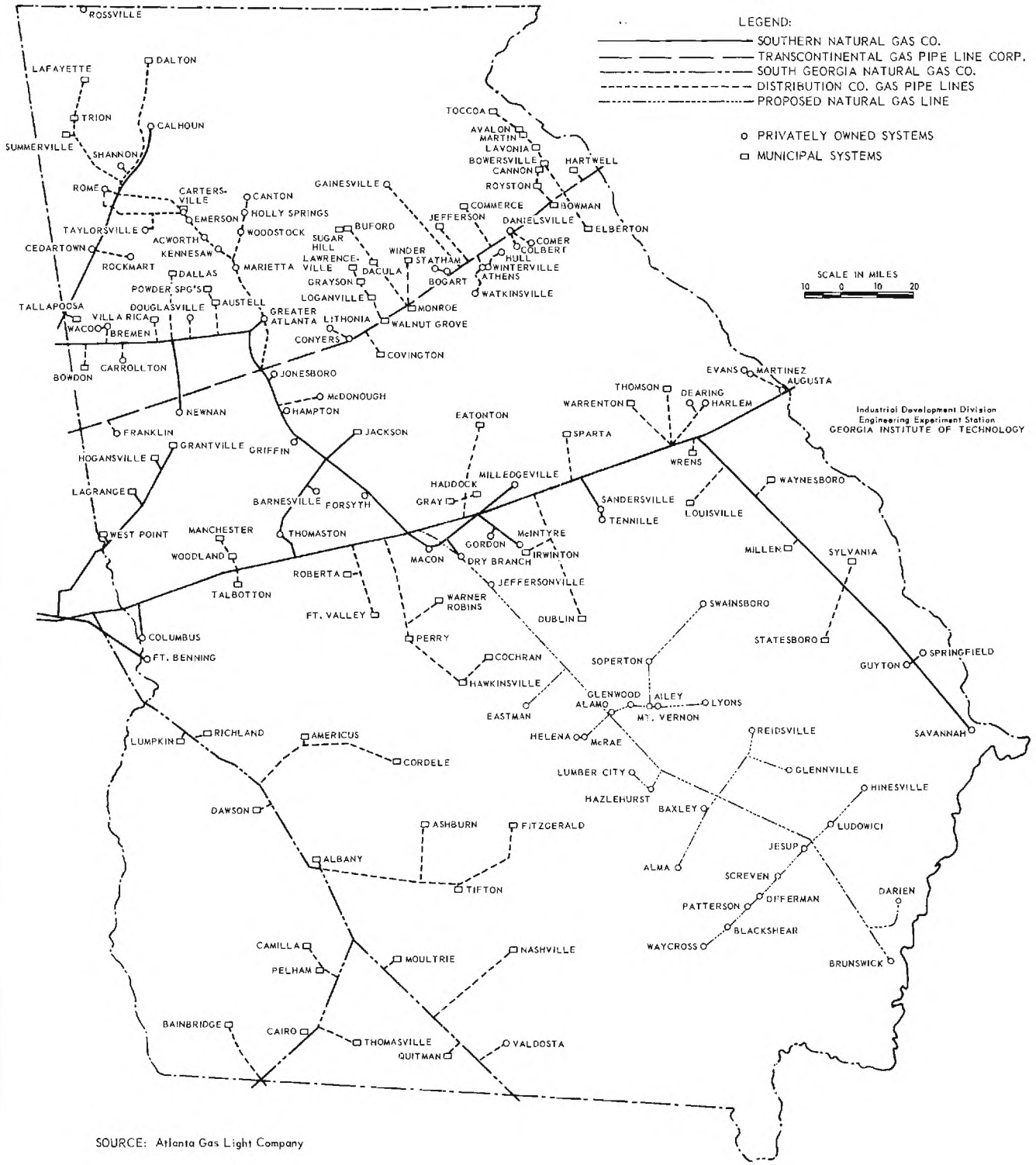
Because of the state's proximity to the gas fields of the South Central region of the U. S., the rates for natural gas in Georgia compare favorably with those of other U. S. cities. (See Table 5.)

Natural gas rates in Columbus, Georgia, and in cities served by Atlanta Gas Light Company are lower than in most of the cities now producing glass wool for southeastern consumption. Fuel costs in various locations for a plant using 400,000 therms monthly (4,800,000 annually) are:

Plant Location	Annual Fuel Costs
Defiance, Ohio	$288,000
Newark, Ohio	244,000
Shelbyville, Indiana	202,000
Barrington, New Jersey	199,000
ATLANTA, GEORGIA	132,000
Kansas City, Kansas	121,000
Waxahachie, Texas	102,000

MAP 4

NATURAL GAS FACILITIES IN GEORGIA



SOURCE: Atlanta Gas Light Company

Table 5

COMPARATIVE NATURAL GAS RATES FOR 23 U. S. CITIES

	10,000 Therms/mo (1,000 MCF) 1/	30,000 Therms/mo (5,000 MCF) 2/	100,000 Therms/mo (10,000 MCF) 2/
Oklahoma City, Okla.	$ 254	$1,044	$1,945
Houston, Tex.	268	1,000	(a)
Memphis, Tenn.	412	1,282	2,213
Atlanta, Ga.	467	1,380	2,760
Columbus, Ga.	478	1,574	2,858
Kansas City, Mo.	488	1,314	2,558
San Francisco, Cal.	598	2,614	4,964
Louisville, Ky.	602	2,540	4,890
Gaffney, S. C.	611	1,919	3,319
St. Louis, Mo.	612	(a)	(a)
Cincinnati, O.	628	3,108	6,209
Columbia, S. C.	665	(b)	(b)
Athens, Tenn.	675	2,210	4,410
Cleveland, O.	678	3,133	6,083
Knoxville, Tenn.	724	3,173	4,188
Chicago, Ill.	741	1,575	3,150
Nashville, Tenn.	750	1,500	3,000
Richmond, Va.	780	3,580	7,080
Bristol, Va.	795	2,300	4,550
Detroit, Mich.	838	2,366	4,731
Chattanooga, Tenn.	845	2,290	4,340
Syracuse, N. Y.	968	3,471	6,921
Charlotte, N. C.	1,176	2,325	4,263

1/ Firm service

2/ Interruptible service

(a) Rates negotiated by special contract

(b) Rates not quoted

Source: Based on American Gas Association Rate Book, September 23, 1963

The annual fuel costs for a glass wool plant in Georgia producing $5 million worth of insulation materials would be $11,000 to $30,000 greater than for an operation of similar size in Kansas City or Waxahachie, but would be $67,000 to $156,000 less than in any of the other cities shipping to the southeastern market.

CONCLUSION

A Georgia company, profiting by proximity to an established market and a total absence of manufacturing competition, could produce and deliver glass wool insulation material to the southeastern market more economically than any manufacturer presently servicing the area. (See Table 6.)

Table 6

TOTAL FREIGHT, LABOR, AND GAS SAVINGS
OF GEORGIA PLANT OVER EXISTING GLASS WOOL INSULATION PLANTS
($5 Million Sales in Southeastern Area)

GEORGIA over:	Freight	Labor	Gas	Total Savings
Barrington, N. J.	$234,000	$518,000	$ 67,000	$819,000
Defiance, Ohio	193,000	432,000	156,000	781,000
Shelbyville, Ind.	162,000	537,000	70,000	769,000
Newark, Ohio	190,000	432,000	112,000	734,000
Kansas City, Kan.	243,000	295,000	-11,000	527,000
Waxahachie, Texas	227,000	151,000	-30,000	348,000

The total freight, labor, and gas savings for a Georgia producer with sales of $5 million annually could range from $348,000 to $819,000. This is equivalent to an additional profit on sales of from almost 7% to more than 16%.

APPENDICES

Appendix 1

CORRELATION BETWEEN THE VALUE OF SHIPMENTS OF MINERAL WOOL AND RESIDENTIAL AND NONRESIDENTIAL CONSTRUCTION

Year	X	Y	x (X-A)	y (Y-A)	xy	x^2	y^2
1950	113	206	-71	-72	5112	5041	5184
1951	130	218	-54	-60	3240	2916	3600
1952	135	227	-49	-51	2499	2401	2601
1953	149	244	-35	-34	1190	1225	1156
1954	163	266	-21	-12	252	441	144
1955	201	308	17	30	510	289	900
1956	198	308	14	30	420	196	900
1957	207	316	23	38	874	529	1444
1958	247	322	63	44	2772	3969	1936
1959	297	366	113	88	9944	12769	7744
Sum	1840	2781			26813	29776	25609
Average (A)	184	278					

Number (N) = 10

$$\sigma_x = \sqrt{\frac{\Sigma x^2}{N}} = \sqrt{\frac{29776}{10}} = \sqrt{2978} = 54.6$$

$$\sigma_y = \sqrt{\frac{\Sigma y^2}{N}} = \sqrt{\frac{25609}{10}} = \sqrt{2561} = 50.6$$

$$\text{Coefficient: } r = \frac{\Sigma xy}{N\sigma_x \sigma_y} = \frac{26813}{10(54.6)(50.6)} = \frac{26813}{27628} = 0.97$$

X = Mineral wool

Y = Residential and nonresidential construction

Appendix 2

CARLOAD FREIGHT RATES FOR FIBER GLASS INSULATION MATERIAL
(in cents per 100 pounds)

	FROM:						
TO:	Atlanta Ga.	Barrington N.J.	Defiance Ohio	Newark Ohio	Kansas City Kan.	Shelbyville Ind.	Waxahachie Tex.
Atlanta, Ga.	31*	134	119	117	144	106	141
Birmingham, Ala.	62	145	119	119	130	106	124
Charlotte, N. C.	78	110	110	102	152	110	170
Jacksonville, Fla.	84	143	151	149	168	143	157
Memphis, Tenn.	93	160	112	119	102	102	78
Miami, Fla.	121	174	182	180	199	174	188
Tampa-St. Petersburg, Fla.	102	161	166	163	180	156	169

*Truck rate

Note: Rates are based on minimum carload weight of 24,000 pounds.

If it is assumed that shipments to the above seven southeastern cities would be representative of shipments to the Southeast, average freight rates from selected points of manufacture to the southeastern market can be determined by multiplying each southeastern city's share of construction materials wholesale sales (Table 2) by the freight rate to that city (above) from each manufacturing point. The sum of these figures is the average rate to the Southeast.

AVERAGE RATES TO THE SOUTHEASTERN MARKET
(in cents per 100 pounds)

		FROM:						
TO:	Per Cent of Sales	Atlanta	Barrington	Defiance	Newark	Kansas City	Shelbyville	Waxahachie
Atlanta	28	9	38	33	33	40	30	39
Birmingham	19	12	28	23	23	25	20	24
Charlotte	8	6	9	9	8	12	9	14
Jacksonville	12	10	17	18	18	20	17	19
Memphis	11	10	18	12	13	11	11	9
Miami	12	15	21	22	22	24	21	23
Tampa-St. Petersburg	10	10	16	17	16	18	16	17
Average Rate to the Southeast		72	147	134	133	150	124	145